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WELCOME TO CHEMISTRY

CHAPTER ONE
INTRODUCTION

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SECTION 1.1 Chemistry

What is Chemistry?

Chemistry is the study of the composition of matter and the changes that matter undergoes.

Matter: Anything that has mass and takes up space

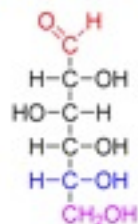
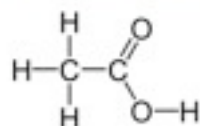
What does this mean?...

that's right... chemistry has to do with **everything!**

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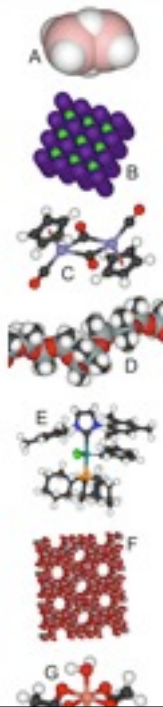
AREAS OF STUDY:

Organic chemistry: Study of all chemicals containing carbon
- includes ALL living things



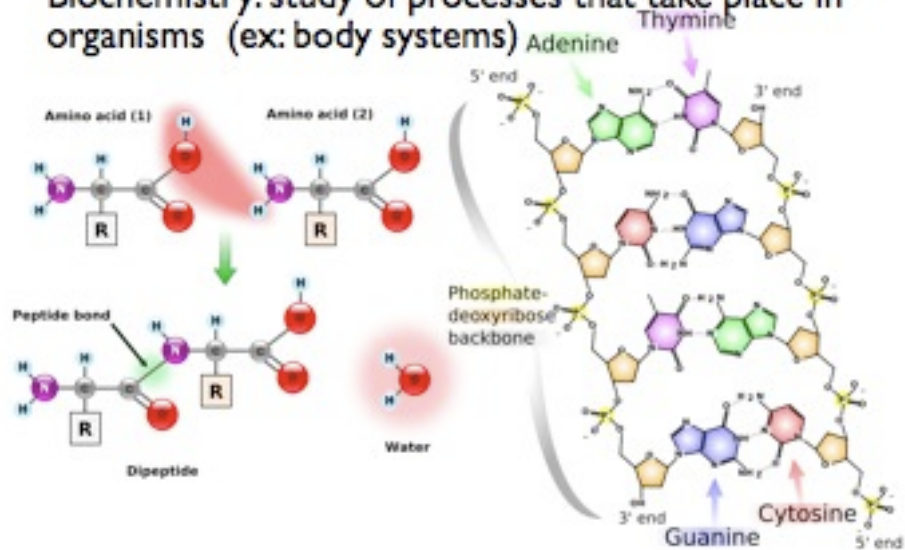
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Inorganic chemistry: study of all chemicals that do not contain carbon... ex: NaCl, Au



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Biochemistry: study of processes that take place in organisms (ex: body systems)



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Analytical chemistry: study that focuses on the composition of matter (ex: % sucrose in soda)



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Physical chemistry: study of mechanisms, rate, and energy transfer occurring during changes of matter



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Which area of study is appropriate for the following situations?

measuring the amount of lead in drinking water

analytical chemistry

what makes ethanol ($\text{C}_2\text{H}_5\text{OH}$) different from methanol (CH_3OH)

organic chemistry

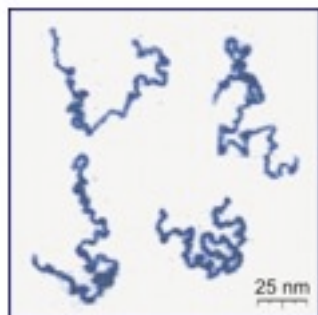
determining how much energy is produced when different fuels burn

physical chemistry

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Pure Chemistry:

experimenting for the fun of it, with no practical use in mind (*but practical uses may result*)



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Aspirin was a product that was developed before chemists understood how it worked.



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Vocabulary:



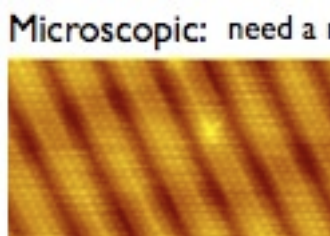
Technology: the means by which society provides its members with things that are needed and desired.



Biotechnology: applies science to the production of biological products or processes.



Macroscopic: can be observed with naked eye.



Microscopic: need a microscope.

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Applied
chemistry-

research that is
directed toward a
practical goal or
application



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Section 1.3 Thinking like a scientist!

Chemistry comes from the word *alchemy*:

Alchemists' goals:

Turning common metals into gold
Finding the Philosopher's Stone, or
the elixir of life

to bring together and pull apart



Nicholas Flamel was a famous alchemist in the 1300's. He supposedly found the Philosopher's Stone and became immortal.

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Alchemists developed the tools and techniques for working with chemicals, but did not provide any logical explanations for the changes in matter they observed.

Take reddish rich Virgin Earth in ♀, impregnate it with ☉, ☿, serene and dew, till the end of May: Then imbibe sprinklingly with dew gathered in May, and dry in ☉, expose all Night to the ☿ and Air, securing it from Rain. Still when it is dry, imbibe and turn the Earth often. Continue this till ☿ maturation. The hot ☉ (especially in the Dog-days) will make a pure Salt shoot up, which mingle back into the Earth, by turning it all over. Then distill by graduated △ as A.P. forcing all the Spirits

An Explication of the Characters which are used in this Book.

☉ Gold.	A. F. Aqua Fortis.
☿ Silver.	A. R. Aqua Regia.
♂ Iron.	S. V. Spirit of Wine.
☿ Mercury.	☿ Sublimate.
♃ Jupiter.	☿ Precipitate.
♀ Venus.	☿ Amalgama.
♄ Lead.	▽ Water.
♂ Antimony.	△ Fire.
✱ Sal armoniac.	

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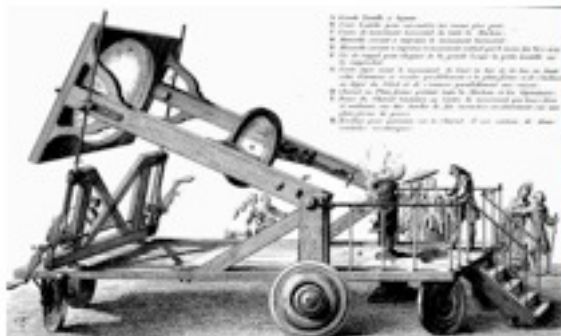
1700's: Chemistry was transformed from a science of observation to a science of measurement.

Antoine Lavoisier - father of modern chemistry



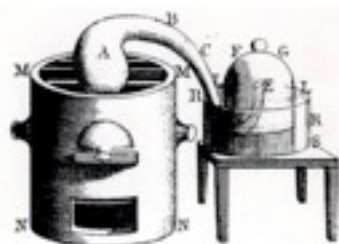
Lavoisier developed many instruments that could take precise measurements.

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Lavoisier's wife sketched his equipment and many experiments, took notes, and translated texts for him.

He is credited with discovering oxygen (which is controversial). His apparatus that helped him discover oxygen and nitrogen in air.



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The Scientific Method

Observation: use your senses

Hypothesis: proposal for what is happening

Experiment: to test your proposal

independent, (manipulated) variable:

changed directly by you

dependent (responding) variable:

observed during the experiment

Theory: a **well tested explanation** for
a broad set of observations.

A good theory can be used to
make predictions.

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Scientific Law: A concise summary of the results of many
observations and experiments.

Gas laws

Law of conservation of mass

Law of gravity

*These laws often
use math equations
to describe what
happens.*

Laws only *describe* what happens, they don't *explain* it!
Explanations require **theories!**

Ex: Gas Laws are explained by The Kinetic Theory.

Theories are **extremely** well-tested, but can be
modified as new evidence is obtained.

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